How energy development influences the life of Ollie the Ovenbird

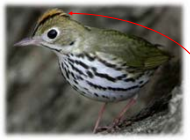
with a
cameo from Dr. Erin Bayne
on how Ollie's story has
influenced bird monitoring in
Alberta's oilsands

Who is Ollie & why did we pick him as a focal species to study energy sector impacts?

Ovenbird
Seiurus aurocapilla
PHOTO: GARRY KESSLER

- Is easy to detect (loud)
- Reasonable number of them in forest types that remain reasonably common
- Long-distance neotropical migrant, which are a group of concern
- Most studies across Ovenbird range suggest:
  - Avoid placing territories near edges
  - Less abundant in smaller patches
  - Less likely to occur in isolated forest fragments
  - Forest specialist

Plus, Ollie has terrific "hair", just terrific!



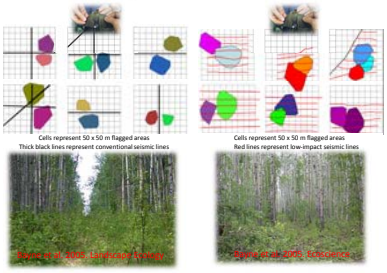
Methods used to monitor Ollie in the Oilsands

Territory mapping:
Follow birds using telemetry or visual observation to map exactly where known individuals go.
Good data on behaviour only. Often used to get data on pairing & reproductive success at same time.
No abundance data & 1 species at a time.

Spot mapping:
People walk grid systematically to locate hotspots of singing birds. Approximate locations known (~25m) but individual identity not. Poorer quality than territory mapping data but get behaviour & abundance on multiple species.

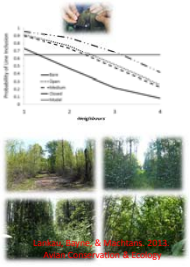
Point count:
People stand in fixed position for fixed time and count # of individuals they hear and see.
Locations least precise (~50m).
Individual identity assumed during time person present.
Abundance data only, but for > # of species.

Ollie's response to linear features: Issues of methodology, line type, vegetation state & spatial scale



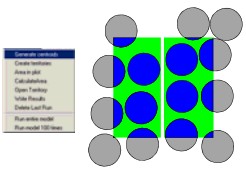
Conventional 8 metre seismic line

Low-impact 3 metre seismic line



Conventional w/ different recovery

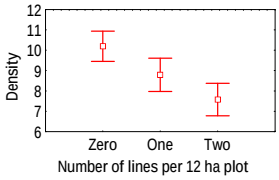
Does the "fences make for good neighbours" hypothesis allow us to predict local population size?



MODEL ASSUMPTIONS

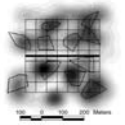
- 0.6 to 1.2 ha territories
- No overlap
- Circular territories
- At carrying capacity

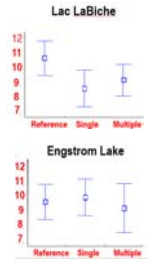
In theory



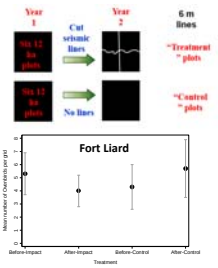
Observed Ovenbird population size in areas with different #'s of conventional seismic lines

In reality



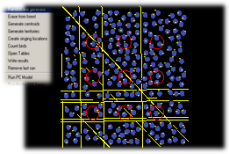


Bayne et al. 2005. Landscape Ecology

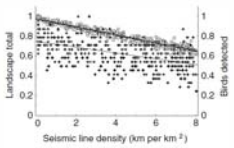


Machtans. 2006. Canadian Journal of Zoology

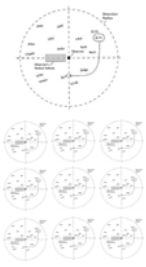
Point counts, spatial scale, & how it influences our perspective on magnitude of impact



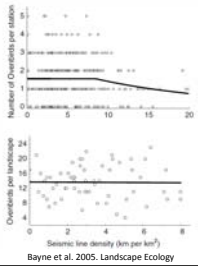
In theory



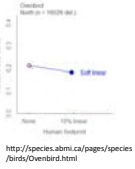
Spatial scale, point counts, & inference about effects of linear features on population size



Reality from single study



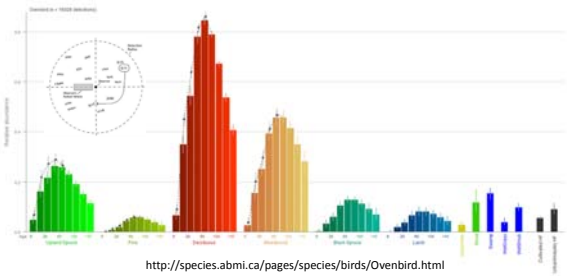
Reality from all PC in AB



http://species.abmi.ca/pages/species/birds/Ovenbird.html

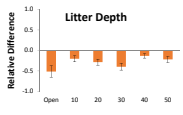
Bayne et al. 2005. Landscape Ecology

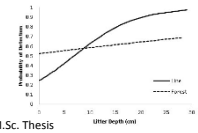
Point counts show us Ollie likes dense overhead deciduous cover & deep leaf litter



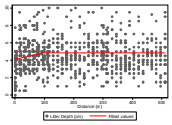
http://species.abmi.ca/pages/species/birds/Ovenbird.html

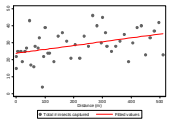
Ollie feeds on invertebrates found in leaf litter & linear features influence both





AGE OF SEISMIC LINE – Lankau 2014 – M.Sc. Thesis



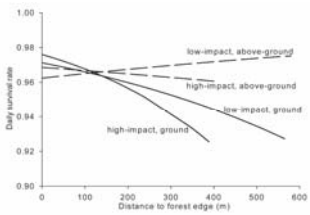


DISTANCE FROM PIPELINE EDGE – Blake 2012 – Hons. Thesis

Ollie's mate nests on ground but she is no more susceptible to predation & brood parasitism near lines

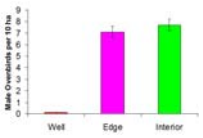
Red squirrels dominant nest predator.
About 50% of nests fail.

No brood parasitism observed in 700+ nests

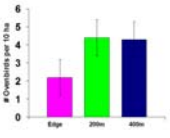


Low impact – Single pipeline dominates landscape
High impact – Many pipelines, seismic lines, and roads in landscape
Ball, Bayne, and Machtans – 2009 - PIF Conference Proceedings

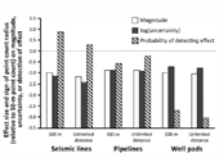
How does Ollie respond to other types of energy sector footprint & does it matter how we measure it?



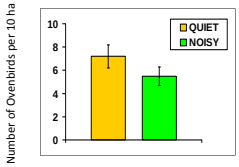
50 metre radius point count

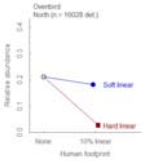


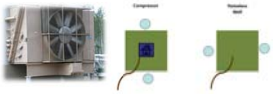
50 metre radius point count



Does Ollie care about the foot more than footprint?

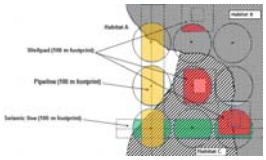






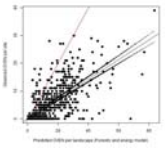
Bayne, Habib, & Boutin. – Cons. Biol. - 2008

Can we accurately predict cumulative effects from local control-impact studies?



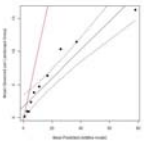
Used all data from Bayne lab & Boreal Avian Modelling project to create models of how Ovenbirds respond to forestry, fire, & energy.

Predicted how many Ovenbirds expected at ABMI sites based on their footprint at time of survey.



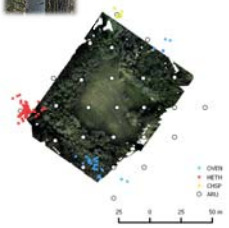
Ability to predict # of Ovenbirds at individual ABMI sites. $r^2 = 0.45$.

However, adding energy effects & whether a forest stand originated from harvest or fire did not improve model fit as including variation in forest age & composition.

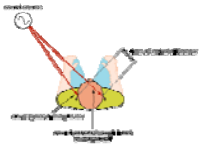


Ranked ABMI sites into 10 "quality" categories for Ovenbirds based on BAM/ Bayne cumulative effects models and found strong correlation with average observed abundance of Ovenbirds at ABMI sites

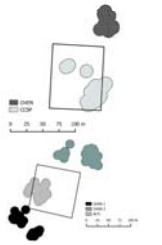
Technological improvements for local-scale monitoring using ARUs



Example data from acoustic localization. Singing locations are buffered for error in localization. Vegetation from drone & ground-based photogrammetry

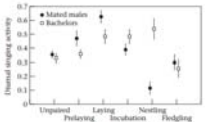


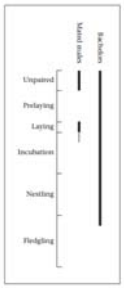
IBERA



Ovenbirds are more likely to sing from the edge of reclaimed well sites as canopy cover increases on the wellpad edge.

Reproduction data from ARUs?





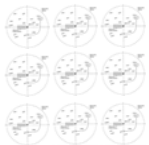
Nightingale example
Amrehein et al. 2002. Animal Behavior

CURRENT PROJECT

- 26 OSFL territories monitored
- 16 nests found. Determined if:
  - Nest fledged young
  - Eggs hatched
  - Female laid eggs
  - Predation occurred
  - Male & female pair date
- Grid of ARUs around male recording song rate for most of the day. 286 days of data
- Correlating computer-based & human-based detections of OSFL song with reproductive state

ARU technology & Cumulative Effects

Replication to date
> 50,000 STATIONS



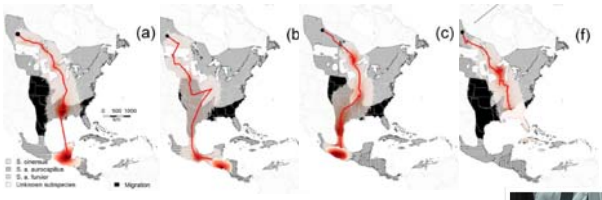
Replication to date
>1000 SITES

Replication to date
10 LANDSCAPES

Cumulative Effects Grids aka "BIG GRIDS"

10 BIG GRIDS currently done (data currently being listened to). 100 survey points, 600 metres apart.
Four in fully developed SAGD sites, 3 in areas explored & being considered for development, and 3 in control areas.
Point is to assess all types of disturbance, for all species, at many different nested scales.

Don't forget Ollie is a long-distance migrant



If the main limiting factors occur outside the boreal breeding grounds, then boreal habitats for Ovenbirds may not be at carrying capacity. This should make us contemplate our perspectives on what the effects of the oilsands' are per se on Ollie and others.

Hache, Bayne et al. Auk (submitted)

Do we need this level of detail for every species?

- Yes and No. Not all species can be a priority due to costs but this level of detail may be what is required to understand how and why each species is changing.
- I argue the Ovenbird example of studying habitat loss & fragmentation from energy development is the same debate as "what is the effect of pollutant X over what distance" when using different sampling instruments that have greater precision. The question is one of biological relevance & societal concerns about the level of effect.
- With more precise methods in any scientific endeavor, more subtle effects can be detected. If "detecting any effect no matter how small" is the goal, then local scale studies with careful design & detailed behavior measurements are fundamental.
- Understanding bird behaviour will be more effective than measuring population size when assessing the success of mitigation. Application of best practices & restoration tend to be local in scale and the data needs to be measured as such. ARU technology helps us here.
- There is lots of behavioural evidence that best practices (i.e. narrower lines) & restoration can improve conditions for Ovenbirds that are not revealed when using abundance data.
- What you see at the local scale by studying behaviour does not directly translate to changes in populations at larger scales. I argue we need to measure population responses of energy impacts DIRECTLY at at appropriate scales (BIG GRID) to have truly effective monitoring. ARUs can help us here as well.

EMCLA
Ecological Monitoring Committee
for the Lower Athabasca
nexen
Shell
Natural Sciences and Engineering
Research Council of Canada
devon
Canadian Natural
ALBERTA PACIFIC
cenovus
SUNCOR
ConocoPhillips
Environment and
Climate Change Canada
Esso
Imperial Oil